



# Imperial Agricultural Bureau Eleventh Annual Report

OF THE  
Executive Council

1939-1940

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1941

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## PREFACE

The Imperial Agricultural Research Conference, 1927, stressed (a) the need for scientists to be in touch with the progress of research throughout the world in their several branches, and (b) the difficulty therein owing to the great output of scientific literature and the diversity of languages in which it is published.

2. It recommended the Governments of the British Commonwealth to establish on a joint co-operative basis eight bureaux to collect, collate and disseminate information on research in eight selected branches of agricultural science and generally to assist research workers in the Empire with information relevant to their subjects. Each bureau was to be located at a research Institute specializing in its own branch of science so that the bureau officers should be in daily contact with men engaged on research in its own subject. These bureaux were to be financed from a common fund contributed by Empire Governments in agreed proportions and controlled by a Council composed of representatives of those governments on an equal footing.

3. Governments accepted these proposals. In November, 1928, a new type of inter-Imperial co-operative agency acceptable to all governments was worked out in detail. On 1st April, 1929, the Executive Council of the Imperial Agricultural Bureaux came into being. The eight bureaux started work in that year.

4. Following the Ottawa Conference of 1932 the work of several inter-Imperial agencies was examined and reported upon by the Imperial Committee on Economic Consultation and Co-operation (1933). This Committee approved of the bureaux organization and of its work, and extended the duties of the Council, *inter alia*, proposing that with effect from 1st October, 1933, it should also be responsible for the supervision and administration and finance of the Imperial Institute of Entomology and of the Imperial Mycological Institute.

5. It also enunciated certain general principles to be observed in regard to the organization of agencies for inter-Imperial co-operation and consultation, *e.g.*, Constitutional equality of participating governments in the appointment of the Authority administering the work; the provision of adequate finance for a definite period of years; careful and periodical examination of the work and organization of the Agency at Empire conferences suitable for the purpose, as without that assurance governments could hardly be expected to provide the adequate continuing finance; responsibility of the administering authority to all participating governments. All Governments accepted this report.

6. The British Commonwealth Scientific Conference (1936) conducted the first of these "periodical examinations". It approved both the work and organization. It recommended the finance necessary until 1941-42, its distribution between governments, also the formation of two more bureaux, and certain modifications in practice designed to improve general efficiency. Governments accepted these proposals.

7. The organizations under the administration of the Executive Council are:—

The Imperial Institute of Entomology, with its branch, the Laboratory for Biological Control of Insect Pests

The Imperial Mycological Institute and the Imperial Bureaux of

Soil Science.	Pastures and Forage Crops.
Animal Health.	Horticulture and Plantation Crops.
Animal Nutrition.	Agricultural Parasitology (Helminthology).
Animal Breeding and Genetics.	Dairy Science.
Plant Breeding and Genetics.	Forestry.

8. A "liaison" officer appointed by the appropriate department in each participating country keeps in touch with administrative matters, and in each country for each bureau a scientific officer is nominated as Official Correspondent to be "the general friend" on scientific matters of that bureau in that country. The Heads of the several Institutes at which bureaux are located act as Directors of the bureaux, thus giving the Council and bureaux the benefit of their wide experience and scientific knowledge. All other officers are whole-time servants of the Executive Council.

## REPORT

At its annual meeting on 18th December, 1940, the Executive Council of the Imperial Agricultural Bureaux adopted the following report relating to its eleventh year's work—1st April, 1939—31st March, 1940.

### *General*

This report is restricted to administration and finance. Reports by the Directors of the Imperial Institute of Entomology, of the Imperial Mycological Institute, by the Superintendent of the Farnham House Laboratory, Deputy Directors of the Soil Science and new Forestry Bureaux and by Mr. J. G. Hawkes (on the South American Potato Expedition), are given as Appendices. Reference to them is requested. They show, and the same applies to the bureaux generally, that all these organizations were fully used throughout 1939—40.

On the Executive Council Dr. William Allen succeeded Lt.-Col. G. P. Vanier as the representative of Canada ; the Government of Burma appointed the Deputy High Commissioner for India and Burma as its representative.

All arrangements had been made for the Fourth Imperial Mycological Conference to be held 18th to 23rd September, 1939. A fully representative attendance was expected. The Conference had to be postponed as most were unable to attend owing to the outbreak of war.

The Bureaux of Animal Breeding and Genetics and of Plant Breeding and Genetics took part in the International Congress on Genetics which met in Edinburgh towards the end of August, 1939, and was in session when war started.

### *The Impact of War*

2. In May, 1939, the Council considered the action necessary in case of war. It decided that the organizations under its administration would be needed. In most countries in the world agricultural departments and research institutes would still be at work, would be publishing results, would be requiring information. In the British Commonwealth in particular, information which these organizations could supply quickly, would very likely be required urgently in connexion with new problems arising from war conditions.

Were war prolonged work might tend to contract, subscriptions fall and costs rise. Therefore economies would have to be practised, and changes in the general position closely watched.

3. All Liaison Officers were informed of these conclusions by circular letter dated 14th September. Before that circular could have reached them, letters were received from some Liaison Officers and Heads of Departments in



countries overseas urging the necessity for continuing these organizations in time of war. Others wrote agreeing with the conclusions set out in the circular letter.

At the same time Directors and Deputy Directors were asked to press on with any Technical Communications or other special work so as to complete them before costs rose.

4. Regulations essential in time of war, *e.g.*, censorship, control of exchange, etc., inevitably interfered with ordinary routine and caused delay ; but all departments administering those regulations helped to smooth difficulties.

5. Events subsequent to 31st March, 1940, are strictly speaking outside the scope of this report. But the collapse of France caused a new position. Of the organizations under the Executive Council, that of Farnham House was most directly affected. The Continent of Europe was now closed to its work.

The Council decided

- (a) to close Farnham House temporarily ;
- (b) to enquire from the Government of Canada whether it would be agreeable to Dr. Thompson (the Superintendent of the Laboratory) being sent to Canada to be available there for work for Empire countries on Farnham House lines, basing that work for the time being on the Dominion Parasite Laboratory, Belleville, Ontario, Canada ;
- (c) to continue the work on the Parasite Catalogue ;
- (d) to ask Dr. Thompson to prepare a review of the progress and possibilities of biological control of noxious insects.

6. The Council and all countries of the British Commonwealth are much indebted to the Canadian Government whose very prompt welcome to these proposals has enabled these arrangements to be put into effect.

Orders for predators to be found in North America can now be sent to

The Superintendent,  
The Imperial Institute of Entomology  
(Parasite Service),  
Dominion Parasite Laboratory,  
Belleville, Ontario,  
Canada ;

those for execution in the United Kingdom to

The Director,  
The Imperial Institute of Entomology,  
British Museum (Natural History Section),  
London, S.W.7,  
England.

Dr. Thompson has reported that the opportunities in North America for doing work are very favourable and it is hoped that countries in the British Commonwealth of Nations will make full use of them. The Superintendent's report for 1939-40 (Appendix III) shows that the Laboratory was fully occupied in that year.

7. The collapse of France did not affect the work of the Institutes and Bureaux so immediately or so seriously. The receipt of information from the Continent of Europe, other than Russia, has been gravely interrupted (though occasionally some comes through); but that from the rest of the world and from Russia continues. A certain contraction in work has resulted and economies are being made to meet it and to counter rising costs. The Council has suggested to governments a temporary reduction in their contributions to the Farnham House Laboratory, but cannot see its way to do the same in the case of the Institutes and Bureaux. The reasons are:—

- (a) their work has not been so grievously interrupted;
- (b) in peace time receipts other than contributions from Empire governments provide one-sixth of their expenditure and in war time such receipts fall;
- (c) governments have based their present contributions on the maintenance of this ability to attract outside money—in fact they have anticipated the benefits of an increase therein (see Report of the British Commonwealth Scientific Conference, para. 68 and the footnote thereto).

8. The funds for the two Institutes and for the Bureaux are separate, but a consolidated financial statement for the three shows the dependence of these organizations on their outside earnings.

<i>Sources of Income</i>		<i>Expenditure</i>	
	£		£
(i) Contributions from contributing governments .. ..	49,287	Gross expenditure ..	60,310
(ii) Sales of publications .. ..	8,851		
(iii) Contributions from other governments, learned societies, etc. .. ..	1,050		
(iv) Interest on reserve funds and miscellaneous .. ..	1,300		
	<u>£60,488</u>		<u>£60,310</u>

Items (ii) and (iii) totalling £9,900 represent their earning capacity. These are especially vulnerable in war time. Nearly all subscriptions from Continental Europe will fail in the current year.

The statement above, of course, takes no credit for journals and publications distributed free to departments and research institutes in the British Commonwealth at the direction of their several governments. At published prices the cost of these exceeds £3,500, which sum may reasonably be regarded as a rebate on item (i)—contributions from governments.

9. *Changes in Senior Staff.*—Mr. S. F. Ashby, Director of the Imperial Mycological Institute since 1st October, 1935, retired on 31st December, 1939, under the age rules. He joined the Institute as Senior Mycologist in April, 1926, after service in the West Indies. He was a world authority on the genus *Pytophthora*; had a wide knowledge of the diseases of tropical plants; was a firm believer in the usefulness of the Institute to Mycologists and was rightly jealous of its reputation for accuracy and of its general well-being. Dr. S. P. Wiltshire succeeded him as Director.

Mr. J. N. Oliphant, Director of the Forestry Institute, Oxford, and therefore also Director of the Forestry Bureau, left Oxford in July, 1939, on appointment as Chief Conservator of Forests, Nigeria. Dr. L. Chalk, Ph.D., of the Forestry Institute, acted as Director of the Bureau until Professor H. G. Champion—Dr. Troup's successor as Professor of Forestry, Oxford—took charge in the early summer of 1940.

10. Three appointments of Deputy Directors of Bureaux were made in the year :—

	<i>Deputy Director of the Imperial Bureau of</i>	<i>Date of taking charge</i>
Dr. J. E. Nichols, Ph.D., Lecturer, University of Western Australia.	Animal Breeding and Genetics, Edinburgh.	2nd June, 1939.
Mr. J. W. B. Sisam, B.Sc., Dominion Forest Service, Canada.	Forestry, Oxford.	6th June, 1939.
Dr. I. Leitch, D.Sc., Senior Assistant in the Bureau.	Animal Nutrition.	1st April, 1940.

Mr. S. Garthside, of the Australian service, who had worked for some years at Farnham House, was drowned off the South Coast bravely trying to rescue a bather in difficulty.

11. *Publications—Journals.*—The two latest bureaux, Dairy Science and Forestry, issued in May and June (1939) respectively the first numbers of their quarterly abstract journals. Both were well received. In each case the number of subscribers obtained in the first year of issue equalled those obtained by most of the other bureaux in four or five years. This was due partly to the interest of the subjects but also must in part be due to the bureaux as a whole and the work they do being now better known.

12. A small increase each year in the number of the subscribers to the various journals is usual. This has been the case even with the oldest of these organizations (the Imperial Institute of Entomology).

*Number of Subscribers*

Calendar year	<i>Review of Applied Entomology</i>		<i>Bulletin of Entomological Research</i>	<i>Zoological Record Part Insecta</i>
	Series A	Series B		
1934	565	430	362	116
1935	571	436	381	122
1936	588	447	375	120
1937	603	442	386	134
1938	637	464	386	136
1939	664	475	407	119

Sales of Technical Communications, back numbers, etc., though variable from year to year have also in the past generally increased. The outbreak of war has interrupted both these trends. Receipts from sales of publications in the first year of war have been in the circumstances very good; but except for the two new bureaux of Dairy Science and Forestry and two of the earlier bureaux, Plant Breeding and Genetics and Horticulture and Plantation Crops, they are less than in 1938-39. They will be lower still in the current year.

13. Statement of receipts from sales of publications—including journals, back numbers and occasional publications.

	1933-34	1934-35	1935-36	1936-37	1937-38	1938-39	1939-40
	£	£	£	£	£	£	£
Imperial Institute of Entomology	1,875	2,546	2,447	2,524	2,779	2,444	2,037
Imperial Mycological Institute	589	676	698	699	961	1,092	904
The Bureaux, including Nutrition Abstracts and Reviews	2,520	2,996	3,895	4,714	5,068	5,704	5,910
Total	4,984	6,218	7,040	7,937	8,808	9,240	8,851

The last of these items gives the total receipts of all bureaux. They are made up as follows :—

	1933-34	1934-35	1935-36	1936-37	1937-38	1938-39	1939-40
	£	£	£	£	£	£	£
Soil Science .. .. .	73	103	401	276	306	600	478
Animal Health .. .. .	1,161	1,328	1,287	1,373	1,293	1,166	1,146
Animal Nutrition .. .. .	22	16	20	12	29	25	21
Animal Breeding and Genetics .. .. .	79	151	160	156	229	294	203
Horticulture and Plantation Crops .. .. .	115	126	160	151	241	373	393
Pastures and Forage Crops	83	136	208	217	444	521	413
Plant Breeding and Genetics	123	128	131	268	258	314	406
Agricultural Parasitology (Helminthology) .. .. .	18	22	353	295	364	316	228
Dairy Science .. .. .	—	—	—	—	—	5	335
Forestry .. .. .	—	—	—	—	—	3	202
Headquarters .. .. .	5	13	4	46	2	17	19
Total .. .. .	1,679	2,023	2,727	2,794	3,166	3,634	3,844
Nutrition Abstracts and Reviews .. .. .	811	973	1,168	1,920	1,902	2,070	2,066
Total .. .. .	2,520	2,996	3,895	4,714	5,068	5,701	5,910

14. Technical and Occasional Publications issued by the bureaux since the last annual report were :—

<i>Title</i>	<i>Issued by the Bureau of</i>
The Minor Elements of the Soil .. .. .	Soil Science, Rothamsted.
Field Trials : Their Layout and Statistical Analysis ..	Plant Breeding and Genetics, Cambridge.
Bibliography on Cold Resistance in Plants .. .. .	Do.
Research on Grassland, Forage Crops and the Conservation of Vegetation in the U.S.A.	Pastures and Forage Crops, Aberystwyth.
The Control of Weeds .. .. .	Do.
Technique of Grassland Experimentation in Scandinavia and Finland.	Do.
Grassland Investigation in Australia .. .. .	Pastures and Forage Crops, Aberystwyth.

<i>Title</i>	<i>Issued by the Bureau of</i>
Fruit Juices and Related Products .. .. .	Horticulture and Plantation Crops, East Malling.
Plant Hormones and their Practical Importance in Horticulture. . . . .	Do.
Vegetative Propagation of Tropical and Subtropical Plantation Crops. . . . .	Do.
Sprouted Fodder and Germinated Grain in Stock Feeding. . . . .	Animal Nutrition, Aberdeen.
Animal Breeding in the light of Genetics, 1939. . . . .	Animal Breeding and Genetics, Edinburgh.
Bibliography on the Genetics of Drosophila, 1939 .. . . .	Do.
Helminth Parasites of Australia .. . . .	Agricultural Parasitology (Helminthology), St. Albans.
Nematode Parasites of Plants catalogued under their Hosts, 1939. . . . .	Do.
The Phosphatase Test for Control of Efficiency of Pasteurization: . . . . .	Dairy Science, Reading.

#### 15. *Accounts.*—The Bureaux :—

The audited statements are attached.

The total contributions attributable to the year was £28,116 15s. 5d., made up of normal contributions £27,925 plus £191 15s. 5d. from Burma under the arrangement recorded in the report for 1938–39.

Sum attributable to the year .. .. .	£	s.	d.
Add arrears due from Australia (see last year's report) .. .. .	28,116	15	5
	522	18	9
Total due in the year .. .. .	28,639	14	2
Received during the year .. .. .	27,660	5	11
Balance outstanding 31st March, 1940 .. .. .	£979	8	3

£1 had been received in excess from certain contributors and the real balance outstanding was £980 8s. 3d.

This was made up of £42 18s. 3d. on account of the Colonial Empire (since received) and £937 10s. 0d. from Australia, being its quota for the two years 1938–39 and 1939–40 to the addition made to the general bureaux fund to allow a bureau in Forestry to be organized.

16. With the two new bureaux in full operation and the Deputy Director's post at the bureau of Animal Breeding and Genetics filled, expenditure rose to £33,501 2s. 1d. After taking credit for receipts from sales, interest and miscellaneous receipts and the contributions from the Institutes towards Headquarters, there was a debit balance on the year's working of £480 12s. 9d. Had the full contributions expected been received there would have been a small credit balance. The deficit was met by a reduction in cash at the Bank and a small withdrawal from the sum on deposit in the Post Office Savings Bank.

## 17. The Imperial Institute of Entomology :—

The total contributions from governments attributable to the year were £13,482, made up of £13,442 normal plus £40 from Burma under the arrangement recorded in the report for 1938–39.

	£	s.	d.
Sum attributable to the year .. .. .	13,482	0	0
Add balance due and outstanding on 31st March, 1939 .. .. .	502	8	0
Total due .. .. .	13,984	8	0
Amount received .. .. .	13,432	0	0
Balance due on 31st March, 1940 .. .. .	£552	8	0

This was made up of £502 8s. 0d. due from the Australian States and £50 on account of the Colonial Empire. Both of these sums have since been paid.

Other receipts, viz., sales of publications (£2,037 14s. 1d.), contributions from foreign governments, learned societies and interest on reserve funds (£1,053 9s. 4d.) were lower than in the previous year by £406 6s. 9d. and £126 10s. 1d. respectively.

Expenditure at £16,472 12s. 2d. was very similar to that in the previous year. In spite of the fall in sales and miscellaneous receipts there was a small credit balance of £50 1s. 3d. on the year's working.

*The Imperial Mycological Institute*

18. The total contributions from governments attributable to the year were £7,940, made up of normal contributions £7,900 and £40 from Burma under the arrangement recorded in the report for 1938–39.

	£	s.	d.
Sum attributable to the year .. .. .	7,940	0	0
Balance due and outstanding on 31st March, 1939 .. .. .	319	14	0
Total due .. .. .	8,259	14	0
Amount received .. .. .	7,890	0	0
Balance due on 31st March, 1940 .. .. .	£369	14	0

This was made up of £319 14s. 0d. due from the Australian States and £50 on account of the Colonial Empire. Both of these sums have since been paid.

Sales of publications realized £903 18s. 4d., being £187 15s. 8d. less than in the previous year, and contributions from foreign governments, societies and interest at £396 3s. 11d. brought in £25 14s. 11d. more.

Expenditure was very similar to that in the previous year, and in spite of the fall in receipts from sales there was a small credit balance on the year's working.

*Farnham House Laboratory*

19. War severely hampered the work of this laboratory. Work in Czechoslovakia was not attempted. Instead the forests in Finland and in some of the Baltic States were searched. As it was, Dr. Hardy, the Assistant at work there, had to be recalled, and only reached England after war broke out. The car he was using and some of the equipment had to be left behind, and its value has been written off. An assistant was at work in the Mediterranean provinces in France. He had to be recalled in May, 1940, and had great difficulty in returning.

The difficulties in Europe in 1938-39 and 1939-40 were specially unfortunate to the Laboratory as contributing countries were slowly making more use of its services and it was steadily gaining increased scientific recognition (*vide* last year's report).

20. At the beginning of the year an additional assistant was engaged as orders for work had increased in numbers and variety. Four post-graduate students from different universities worked at the Laboratory during the year. A proper cold room was built at a cost of £232, which much simplified the handling of material. The arrangements whereby Australian Entomologists worked at the Laboratory and paid £100 a year rent were terminated and the Australian work was handled in a way similar to that of other countries.

21. Normal contributions amount to £5,075 a year. As a result of past work of the Laboratory the Council had recommended that for 1939-40 contributions be reduced by 20 per cent., *i.e.*, to £4,060. (The original debt had been paid off in 1937-38.) The financial working of the Laboratory since the Executive Council has been responsible for its general administration, has been as follows:—

Period	Expenditure	Contributions (actual)	Fees for special work	Receipts, Sales and Miscellaneous	Total Receipts	Balance on year
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
6 months, Oct., 1933–Mar., 1934 ..	1,303 19 2	Nil	103 5 6	Nil	105 5 6	–1,248 13 8
1934–35..	5,046 19 5	5,035 0 0	322 15 6	127 16 3	5,485 11 9	+438 12 4
1935–36..	5,237 9 11	5,035 0 0	831 1 8	156 15 1	6,022 16 9	+785 6 10
1936–37..	5,624 4 6	5,009 7 6	1,024 14 6	111 8 3	6,145 10 3	+521 5 9
1937–38..	5,453 0 7	4,809 10 9	1,914 12 11	124 8 0	6,848 11 8	+1,395 11 1
1938–39..	5,735 3 0	5,233 11 9	1,542 6 3	139 13 5	6,915 11 5	+1,180 8 5
1939–40..	6,629 19 11	4,184 8 3	1,795 2 4	92 3 11	6,071 14 6	–558 1 5



Fees earned were only once exceeded, and would probably have passed those of 1937-38 had not work been interrupted by war. As it was they failed to set off the reduction (£1,015) temporarily made in contributions and for the first time since 1934 there was a deficit on the year's work. In the circumstances the Executive Council was unable to recommend any reduction in normal contributions for 1940-41.

22. During the year all accounts outstanding on 31st March, 1939, for work previously done were paid. On the 31st March, 1940, accounts amounting to £1,036 4s. 5d. for work done in 1939-40 were still due. Against that, £1,027 10s. 0d. had been received in advance for work to be done in 1940-41.

23. The reconciliation statement of the contributions due from contributing countries and of the amounts received is as follows :—

	£	s.	d.
Normal contributions (£5,075) reduced by 20 per cent. .. ..	4,060	0	0
Add (i) Burma arrears (£40) and due from Australia (£12 10s.) since 1937-38 .. .. .	52	10	0
(ii) Normal excess from Colonial Empire .. .. .	75	0	0
<b>Total due in the year .. .. .</b>	<b>4,187</b>	<b>10</b>	<b>0</b>
Amount received .. .. .	4,184	8	3
<b>Balance due on 31st March, 1940 .. .. .</b>	<b>£3</b>	<b>1</b>	<b>9</b>

This was on account of the Colonial Empire and has since been received.

#### *Potato Expedition*

24. Reference is requested to last year's report. Mr. J. G. Hawkes joined Mr. E. K. Balls in Peru on 12th January, 1939. Their tour ended on 31st August, when Mr. Hawkes set out for England. In the course of that tour they searched the mountainous tracts in Peru, Bolivia, Ecuador, Colombia and part of Argentina for potatoes. Their itinerary, details of the collections made directly and of those obtained through the courtesy of local departments and individuals, also notes on some of the specimens and figures of the distribution made to different portions of the Empire, are given in Appendix VI, prepared by Mr. Hawkes.

25. The specimens collected number some 1,200, and include varieties showing resistance to *Phytophthora infestans* and to drought, capacity to withstand severe frosts, suitability to conditions of short and regular daylight. If plant breeders in the British Commonwealth of Nations can combine such of these qualities as they need with the commercial requisites of yield, manageability and palatability, the successful production of this important crop should be widely extended.

26. Collection is one part of the task. Multiplication to allow distribution

and preliminary examination to know what has been collected is also necessary. In the last annual report the aid given in this side of the work by Dr. Salaman, the School of Agriculture at Cambridge, the Agricultural Research Council in the United Kingdom and the Ministry of Agriculture in England and Wales was described. Without that work plant breeders in Empire countries would only have received packets of miscellaneous and largely unknown material. Few, possibly none, would have had a complete collection as in most cases the quantity originally collected was insufficient for general distribution.

27. The work of collection was just completed when war broke out. It was estimated that its multiplication would in the most favourable conditions occupy at least another two growing seasons—*i.e.*, until December, 1941. Dr. Salaman, who had without remuneration supervised this work on the Titicaca and Mexican collections, retired on the 31st August, 1939. The funds contributed by governments had been calculated as only sufficient to cover the cost of the expedition. Mr. Balls and Mr. Hawkes had been extremely economical during their tour, and a small but insufficient balance was available. All at Cambridge, especially those connected with the Plant Breeding Institute, arranged for this work of multiplication and preliminary examination to be continued on an extremely economical basis. Mr. Hawkes was put in charge of it—the Royal Society of England generously making a gift of £100 for one year towards his salary. The Council is submitting to governments a report on this potato work; it would only acknowledge here the great help it has had throughout from everyone at Cambridge (especially Dr. Salaman, Professor Engledow and Dr. Hunter,) from the Agricultural Research Council, from His Majesty's Foreign Office and representatives in South America, from those Governments and their agricultural departments and scientists. Great credit is also due to Mr. Balls and Mr. Hawkes for their energy, knowledge and carefulness.

28. Samples of many of the varieties collected have already been distributed with preliminary descriptions of their characteristics. More have become available from the growing season of 1940.

### *The Research Schemes*

29. *Low Temperature Research.*—With effect from 1st July, 1939, the contribution of the Australian Government to this work ceased. The contributions of governments paid through the Executive Council in 1939–40 were therefore :—

Australia (one quarter)	..	..	..	..	..	£	375
New Zealand .. ..	..	..	..	..	..		2,000
Union of South Africa	..	..	..	..	..		850
Southern Rhodesia ..	..	..	..	..	..		50
						<hr/>	
							£3,275
						<hr/>	

*Wool Industries Research Association, Torridon.* In 1939-40 the contributing governments were Australia (£1,000) and New Zealand (£300). These sums were duly received and paid to the Research Association.

*Chairman and Vice-Chairman*

30. With the adoption of this report Mr. F. J. du Toit's (Union of South Africa) period of two years' office as Chairman of the Executive Council has come to an end. Dr. William Allen (Canada) has been elected Chairman and Mr. S. Lall (India and Burma) Vice-Chairman.

*Conclusion*

31. The year and summer of 1940 have been difficult times for all, above all for those at Farnham House Laboratory. The good work done throughout by all its officers and staff, especially those at the Institutes, the Bureaux and at that Laboratory has given the Council much satisfaction.

F. J. DU TOIT,  
*Chairman.*

**Receipts.**

[illegible]

\* Includes £431 15s. 10d. held on behalf of Potato Expedition Fund, and £100 held on behalf of *Journal of Dairy Research*.

THE EXECUTIVE COUNCIL OF THE IMPERIAL AGRICULTURAL BUREAUX—continued.

<i>Investments at 31st March, 1940:—</i>		<i>£</i>	<i>s.</i>	<i>d.</i>
£4,000 5% Conversion Loan 1944/64 at cost	.. ..	4,152	16	—
£2,000 4% Commonwealth of Australia Registered Stock 1955/70 at cost	.. ..	1,940	4	—
£4,000 3% Commonwealth of Australia Registered Stock 1939/41 at cost	.. ..	3,959	14	0
Post Office Savings Bank .. ..	.. ..	4,667	17	8

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct.

(Signed) G. C. UPCOTT,  
Comptroller and Auditor General.

(Signed) W. G. IVES, *Accountant*.

(Signed) DAVID CHADWICK, *Secretary*.

The Executive Council of the Imperial Agricultural Bureaux.  
21st August, 1940.

# IMPERIAL INSTITUTE OF ENTOMOLOGY. ACCOUNT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDING 31ST MARCH, 1940.

Receipts.		Payments.	
	£ s. d.		£ s. d.
Balance on 1st April, 1939	7,570 12 10	Salaries, Director, etc.	2,400 - -
Contributions from:—		F.S.S.U. contributions	240 - -
Empire Governments	13,432 - -	Salaries, Scientific staff	7,405 4 5
Foreign Governments	375 - -	F.S.S.U. contributions	708 10 -
Societies	150 - -	Salaries, whole time staff	2,536 19 10
	13,957 - -	F.S.S.U. contributions	216 9 6
Interest and Dividends	528 9 4	Salaries, part time staff	4 17 6
Sale of Publications	2,037 4 1	National Insurance	14 10 8
		Travelling expenses	2 14 6
		Books, Publications	127 - 5
		Bulletins	1,481 18 6
		Stationery, Postage, Telephones	106 11 11
		Rent, Rates, Insurance	362 11 4
		Housekeeping, Light, Heat, Water, Cleaning	305 8 -
		Laboratory Equipment	34 17 3
		Contingencies	- 10 6
		Furniture	34 7 11
		Contribution towards Headquarters and	£ s. d.
		Audit Fee, 1938-39	250 - -
		Contribution towards Headquarters and	£ s. d.
		Audit Fee, 1939-40	250 - -
			500 - -
			10,472 12 2
		Balance on 31st March, 1940:—	£ s. d.
		Joint Colonial Fund	- - 0,500 - -
		Crown Agents for the Colonies	553 17 6
		Less receipts proper to Parasite Laboratory, Farnham House	183 14 7
			370 2 11
		H.M. Stationery Office	600 - -
		Sir Guy Marshall	45 16 6
		F.S.S.U. Suspense	104 18 7
			7,620 17 -
		Less Widows' and Orphans' Insurance	- 2 11
		Employees' contribution	7,620 14 1
			£24,093 6 3

IMPERIAL INSTITUTE OF ENTOMOLOGY—continued.

Investments on 31st March, 1940:—		£	s.	d.
£1,010	5 2 Queensland 1922/47 Stock 3% at cost ..	1,000	—	—
£1,000	— — Cyprus 1935/36 Stock 1% at cost ..	950	—	—
£2,659	13 5 — Funding 1930/30 Stock 4% at cost ..	1,560	12	6
£1,000	— — Jamaica 1932/32 Stock 4% at cost ..	940	—	—
£1,017	10 8 Kenya 1931/71 Stock 11% at cost ..	995	15	—
£1,000	— — India 1929/32 Stock 4% at cost ..	936	7	—
£1,000	— — Nigeria 1933 Stock 1% at cost ..	831	7	—
£9,738	— 10	£7,576	1	6

I have examined the above Account. I have obtained all the information and explanations that I have required, and certify, as the result of my audit, that in my opinion the above Account is correct.

(Signed) G. C. VECOTT,  
Comptroller and Auditor General.

Assigned GUY A. K. MARSHALL, Director.  
Assigned W. G. IVES, Assistant to Council.  
Assigned DAVID CHADWICK, Secretary.

Executive Council of the Imperial Agricultural Bureau.

1961, June, 1910,

# IMPERIAL MYCOLOGICAL INSTITUTE, FERRY LANE, KEW, SURREY. ACCOUNT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1940.

## Receipts.

Balance on 1st April, 1939

Contributions.—

Empire Governments ..

Foreign Governments ..

Societies .. ..

Dividends and Interest

Publications .. ..

£ s. d.  
3,534 5 3  
8,115 — —  
171 3 11  
903 18 4

## Payments.

Director's Salary .. ..  
Superannuation .. ..  
Scientific and Technical Staff Salaries .. ..  
Superannuation .. ..  
Clerical Staff Salaries .. ..  
Superannuation .. ..  
Laboratory Attendant .. ..  
Superannuation .. ..  
Overtime .. ..  
National Insurance .. ..  
Travelling .. ..  
Purchase of books .. ..  
Issue of Periodicals .. ..  
Postage, Stationery, Telephone, etc. .. ..  
Rent, Rates and Insurance .. ..  
Light, Heat, Water, Cleaning .. ..  
Laboratory apparatus .. ..  
Audit and Contribution to Headquarters, 1938-39. .. ..  
Audit and Contribution to Headquarters, 1939-40. .. ..  
Equipment .. ..  
Imperial Mycological Conference. .. ..

£ s. d.  
1,183 6 8  
142 — —  
4,239 11 9  
449 19 2  
782 17 4  
34 12 —  
200 2 5  
20 3 —  
7 14 —  
16 17 9  
5 7 9  
68 13 3  
898 3 6  
127 8 6  
110 16 7  
206 8 3  
35 9 6

21

Balance on 31st March, 1940 :—

Joint Colonial Fund .. ..  
Crown Agents .. ..  
Bank .. ..  
Cash .. ..  
Stamps. . . . .  
F.S.S.U. Suspense Account .. ..

£ s. d.  
2,500 — —  
841 4 9  
365 18 2  
— 5 9  
6 7 5  
90 1 9

£12,724 7 6

Investments at 31st March, 1940 :  
£2,077 16s. 4d. New Zealand 4½% 1944 at cost £2,000

£12,724 7 6

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct. (Signed) G. C. UPCOTT,

Comptroller and Auditor General.

(Signed) S. P. WILTSHIRE, Director.  
(Signed) W. G. IVES, Accountant to Council.  
(Signed) DAVID CHADWICK, Secretary.  
The Executive Council of the Imperial  
Agricultural Bureaux.

4th July, 1940.



## 22

馬、牛、羊、猪、雞、犬、猫、兔、鼠、

*General A/c. Capital A/c.*  
*£ s. d. £ s. d.*  
*Balance at 31st March, 1940:*

Crown Agents for  
 the Colonies... 497 4 4  
 Joint Colonial  
 Fund ... 2,000 - - 100 - -  
 Deposit with Bank  
 Superintendent,  
 etc. ... 82 13 8  
 F.S.S.U. .. 30 18 3

Less Widows'  
 and Orphans'  
 Insurance Em-  
 ployees' con-  
 tribution .. - 3 3

2,610 13 - 100 2 4

Less due to  
 Crown Agents  
 for the Colonies

- - 1  
 100 2 3

2,770 16 3

£9,506 11 2

£9,506 11 2

£ s. d.

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct.

(Signed) G. C. UPCOTT,  
Comptroller and Auditor General.

(Signed) W. R. THOMPSON, Superintendent.  
(Signed) W. G. IVES, Accountant to Council.  
(Signed) DAVID CHADWICK, Secretary,  
Executive Council of the Imperial Agricultural Bureaux.  
26th June, 1940.

## APPENDIX I

IMPERIAL INSTITUTE OF ENTOMOLOGY  
DIRECTOR'S REPORT FOR 1939-40

Seven months of war inevitably affected the work of the Institute though not so seriously as might have been expected. The number of foreign journals available for review gradually diminished, but not greatly at first. The insects sent in for identification also fell off considerably, but not a single incoming or outgoing parcel was lost, and only one (to the Netherlands Indies) was at all seriously damaged.

The proposed removal of the Publication Office to the Entomological Wing of the Natural History Museum has had to be indefinitely postponed. Arrangements have been made with the Royal Entomological Society of London for further storage accommodation on the top floor of 41, Queen's Gate.

Few members of the staff are liable for military service. By the end of March only two had been called up: Mr. L. A. Tillin and Mr. F. Alford.

*Identification of Insects*

The number of specimens received amounted to 71,516 (85,460). These insects were sent in by 150 (193) different correspondents, who were geographically distributed as follows:—Africa 43 (59), America 21 (29), Asia 41 (44), Europe 28 (38), Oceania 17 (23), all the numbers in brackets being those for the previous year.

The lists of identifications sent out totalled 337 (406), comprising 7,781 (9,495) names. The actual numbers of identifications sent to the various Dominions, Colonies and other territories are as follows:—

AFRICA	..	..	Union of South Africa	..	..	136	(319)				
			Southern Rhodesia	..	..	100	(392)				
			Sudan	..	..	310	(328)				
			Gold Coast	..	..	38	(67)				
			Kenya	..	..	1,332	(627)				
			Nigeria	..	..	132	(88)				
			Nyasaland	..	..	25	(32)				
			Sierra Leone	..	..	28	(63)				
			Tanganyika Territory	..	..	104	(165)				
			Uganda	..	..	551	(619)				
			Other Territories	..	..	534	(604)				
								3,290	(3,304)		
AMERICA	..	..	Canada	..	..		(72)				
			West Indies	..	..	255	(404)				
			Other Territories	..	..	42	(142)				
								297	(618)		
ASIA	..	..	India and Burma	..	..	492	(1,052)				
			Ceylon	..	..	56	(114)				
			Cyprus	..	..	64	(119)				
			Malaya	..	..	283	(549)				
			Palestine	..	..	697	(505)				
			Other Territories	..	..	1,268	(1,200)				
								2,860	(3,539)		

OCEANIA ..	..	Australia and New Guinea	..	330	(356)		
		New Zealand	.. ..	91	(68)		
		Fiji Islands..	.. ..	281	(633)		
		Solomon Islands	.. ..	197	(140)		
		Other Islands	.. ..	67	(26)		
				—		966	(1,223)
EUROPE ..	..	United Kingdom	.. ..	204	(378)		
		Other Countries	.. ..	164	(433)		
				—		368	(811)

From the collections received thousands of named specimens are, of course, returned to the senders ; but in addition to this 12,790 (23,796) insects have been handed over to the British Museum, of which 256 (252) were types of species new to science, and among the remainder were 512 (824) named species not previously represented in the National Collection. Some 422 named specimens were also presented to Edinburgh University, the Imperial College of Tropical Agriculture, Trinidad, and the Malaria Bureau, Hong Kong.

#### *" Review of Applied Entomology "*

Dr. Neave reports that the 27th volumes (1939) of the two Series of the " Review of Applied Entomology " comprised 964 pages (exclusive of indices) (1,030) and 2,250 abstracts (2,488).

There was again a satisfactory increase in the number of subscribers, which, in the case of Series " A," rose from 637 to 664, and, in the case of Series " B," from 464 to 475. These increases are, however, due to some extent to new subscriptions being received as a result of the alterations in the numbers of free copies sent to various parts of the Empire. Owing to the international situation, the sales of back numbers were again small. This applies to all the Institute's publications. Net cash receipts for the calendar year 1939 were £1,386 12s. 6d. (£1,429 9s. 8d.). This fall of £43 is small in the conditions prevailing, especially as advance subscriptions for 1940 did not come in so freely during December as in previous years.

#### *" Bulletin of Entomological Research "*

The 30th volume (1939) of this journal was larger than that of the previous year, containing 594 pages (478). It comprised 37 separate papers and was illustrated by 19 plates.

The number of subscribers rose from 386 to 407, but there was a relatively small sale for back numbers. The cash receipts, mainly for the same reasons as those given for the " Review," fell from £748 13s. 4d. to £719 8s. 11d.

On the other hand, the cost of production was greater, partly owing to the larger size of the volume and partly owing to an increase of 10 per cent. in the charges for printing and paper. The total cost was £786 1s. 5d. (printing and paper £604 11s. 2d., illustrations and maps £141 3s. 2d., covers and postages £40 7s. 1d.), leaving a deficit of £66 12s. 6d.

#### *" Zoological Record " Part " Insecta "*

Volume 75 (literature of 1938) contained 3,459 titles (3,515). The number of subscribers fell from 136 to 119, and there was also a fall in the sales of back volumes. The profit to the Institute, after deduction of the sums due to the Zoological Society of London, fell from £62 10s. 8d. to £55 10s. 3d.

The annual contribution of £100 was again made to the Institute out of the " Zoological Record " fund towards the cost of preparation.

#### *Other Publications*

During the year 11 further copies of Mr. T. H. C. Taylor's book " The Biological Control of an Insect in Fiji " and 18 of Dr. B. P. Uvarov's book " Locusts and Grasshoppers " were sold. The Institute's commission on the sales of " Les Insectes nuisibles aux plantes cultivées " by Balachowsky and Mesnil amounted to £22 12s. 3d. during the year.

Great progress was made towards the completion of the "Nomenclator Zoologicus," Vol. 1 of which appeared in July and Vol. 2 in December, and, if conditions permit, the two remaining volumes will appear during 1940.

#### *General Information Service*

Many enquiries regarding entomological questions were received from various countries. The following illustrate their scope:—

*United Kingdom.*—A statement for the Colonial Office dealing with methods of controlling pests of stored foodstuffs under tropical conditions, with a view to encouraging the accumulation of such stores in the Colonies.

*Australia.*—Information to the Division of Economic Entomology, Council for Scientific and Industrial Research, Canberra, regarding the importance of termites as pests of growing timber trees in other countries of the Empire.

The first occurrence of the destructive Argentine ant in Australia was recorded, as a result of material received from the Government Entomologist, Victoria.

*Union of South Africa.*—Reports to the Chief Entomologist, Pretoria, and the Director of the South African Sugar Association, Natal, on the geographical distribution and possible methods of control of a West African moth that had developed as a pest of sugar-cane in Zululand.

*New Zealand.*—The High Commissioner's Office made enquiries as to possible methods of preventing the accidental introduction of injurious insects in aeroplanes, a problem that is likely to become of increasing importance.

*Southern Rhodesia.*—A consignment of groundnuts from the Gold Coast having arrived in S. Rhodesia heavily infested by a pest not previously observed in the latter country, advice was sought as to the possibility of excluding such insects by legislation. A report was supplied.

*Kenya.*—The Director of Agriculture was supplied with information on the following points in connexion with locust control: (1) the possible use of arsenic pentoxide as a contact poison—which was not recommended; (2) the use of autogiros for scattering poison bait; (3) a full statement showing the fallacy of the allegation that valuable birds have been largely destroyed by the use of poison baits.

Measures were recommended to the Medical Entomologist for the control of a fly infesting in millions the filter-beds in Nairobi.

*Tanganyika.*—A memorandum was supplied on the suggested control of outbreak centres of the Red Locust by afforestation.

*Nigeria.*—Recommendations were made as to methods for the preservation and storage of large quantities of grain so as to prevent attack by insects.

A report was made on the possibility of controlling a very serious pest of cocoa by means of imported parasites.

Suggestions were made to the Chief Conservator of Forests regarding the possible value of termites in restoring soil fertility.

*Trinidad.*—Advice was sought as to possible risks from Colorado beetle if potatoes were to be imported from France.

#### *Locust Investigations \**

The eighth annual survey of the locust situation in Africa and Western Asia for the year 1938 was completed and that for 1939 is being prepared. Although publication will be deferred until the end of the war, their preparation is being continued in order to provide a continuous

\* This section is included because of its interest to many Empire countries, though the Executive Council is not concerned with this work. The Institute is, however, the centre for it. Its pursuit involves international co-operation.

record of locust movements. Such a record is essential for the proper understanding of the problem and for the organization of control measures.

The routine work of collecting and mapping current locust reports from Africa and Western Asia has not suffered seriously as a result of the war. The reports from all countries continue to arrive. This is a heartening sign of the serious attitude taken by Colonial Governments towards the locust problem, which becomes now even more important than before.

The schemes for the permanent international organization for the prevention of outbreaks in Africa had nearly reached their final stages when war broke out. Practically all the countries concerned had officially expressed their readiness to co-operate financially and administratively. But subsequent events interrupted the conclusion of the diplomatic agreements necessary for the establishment of organizations on an international basis. As a temporary measure, arrangements are being made to establish, under the general guidance of the Institute, three separate organizations, one for each of the main African locust species.

#### *Library*

Accessions during the year numbered 277 (384) volumes and 1,002 (1,103) pamphlets. The Library now contains 10,301 volumes and 27,302 pamphlets.

In addition to the daily internal use of the Library by staff and by visitors, books and pamphlets issued on loan numbered 571 (702); in addition 54 (50) items were lent to Farnham House Laboratory. Books were also sent on loan to Kenya, Palestine and Russia, and a documentary film to India.

The catalogue of serial and official publications was maintained up-to-date (in quadruplicate) and at present comprises over 4,000 slips, many of which contain more than one entry.

The author catalogue was maintained up-to-date for books and separates, and considerable headway was made in the cataloguing of entomological papers in serial publications. At present, the arrears amount to 2,700 volumes, the entire author catalogue being 75 per cent. complete, and comprising some 108,000 cards. In addition, there is maintained a small subject index of monographs (1,100 cards).

#### *Visitors*

The following economic entomologists came to the Institute during the year and discussed various problems in which they were interested:—Dr. J. Davidson, T. Macarthy (grasshopper investigations) from Australia; H. W. Bedford, R. C. Maxwell Darling, D. J. Lewis from Anglo-Egyptian Sudan; H. Wilkinson, Dr. R. H. Le Pelley, A. F. J. Gedye from Kenya; S. N. Bax, E. Burt, of the Tsetse Research Department, from Tanganyika Territory, F. A. Squire from St. Vincent, and Dr. A. M. Adamson from Trinidad, B.W. Indies; H. M. Morris from Cyprus; E. Ballard from Palestine; Dr. J. S. Phillips from British Solomon Islands Protectorate; Dr. H. Smith from California, U.S. America.

#### *Scientific papers published during the year by members of the staff of the Institute*

Thirty-two scientific papers were published during the year by the Staff of the Institute.

G. A. K. MARSHALL.

## APPENDIX II

## IMPERIAL MYCOLOGICAL INSTITUTE

## DIRECTOR'S REPORT FOR 1939-40

The outbreak of war in September, 1939, naturally occasioned some diminution of the work of the Institute during the past year, but in spite of difficulties encountered all the services have been well maintained.

*Investigational Work*

The ultimate aim of all the studies on systematic mycology carried out at the Institute is the accurate naming of plant pathogenic fungi. During the past year an important advance in the standardization of the names of such fungi has been achieved primarily as the result of the initiative of Mr. Mason, who, as a member of the Plant Pathology Committee of the British Mycological Society, was instrumental in bringing about the adoption of the fungus names listed in the Society's "List of Common Names of British Plant Diseases" as standard by 42 Offices, Societies, and Institutes in the British Isles. It is to be hoped that this important movement for standardization, the full significance of which does not yet appear to be fully realized, will spread both within the British Commonwealth and to other countries.

Mr. Dade prepared for publication a list of Gold Coast fungi and plant diseases which was accepted for publication in the *New Bulletin*. He has also continued his studies on the genus *Aspergillus*, 29 cultures of fungi belonging to this group being identified by him during the year. The conclusions reached by him as a result of his studies on *Emericella* have since been confirmed in a paper by Thom and Raper.

Mr. Mason delivered his Presidential Address to the British Mycological Society "On specimens, species and names" and his paper is now in the press.

Dr. Bisby and Mr. Mason together completed the compilation of the "List of British Pyrenomycetes," and the typescript, comprising some 204 pages, is now in the press.

Mr. Mason has also taken an active part in preparing memoranda on the conservation of certain fungus names and the results of this important fundamental work have now been published in the *Transactions of the British Mycological Society*, Vol. XXIII, 3, pp. 281-292, 1939.

Dr. Bisby's paper on *Trichoderma viride* mentioned in last year's report has also appeared in the same journal.

Dr. Ainsworth has begun a critical study of the *Ustilaginales*, a group of great pathological significance. He also published the results of his work on the identification of certain viruses found infecting leguminous plants in Great Britain, carried out before he joined the Institute staff.

From the 1st January, 1940, an attempt was made to compile a list of all new genera, species, and varieties of fungi, new combinations, and new names with a view to publication later. The desirability of such a list is generally conceded by all working systematic mycologists and it is hoped that its compilation will fill a long-felt want in systematic literature.

Dr. Bisby, at the request of the Empire Cotton Growing Corporation, undertook the preparation of a handbook on cotton diseases and made considerable progress in this work.

*Identification Work*

Specimens and cultures have been received from all parts of the Commonwealth as usual, upwards of 500 being identified during the year. About 3,100 additions were made to the

Herbarium, including 94 specimens of Indian fungi generously presented by Dr. R. N. Tandon, Allahabad, and 500 specimens of Rumanian fungi by Professor Tr. Săvulescu, Bucarest. The Institute is indebted to Dr. H. L. Gordon, Canada, for identifications of specimens of *Fusarium*, to Dr. G. B. Cummins, United States, for help with rusts, and to Mr. T. Petch for determinations of entomogenous fungi.

#### *Information Service*

Volume XVIII of the *Review of Applied Mycology* and the Index of Volume XVII were published. The cost of printing and distribution was £898 3s. 6d. and the receipts from sales £903 18s. 4d., leaving a credit balance of £5 14s. 10d. The distribution in March, 1940, was 860 copies.

#### *Staff Changes*

Mr. S. F. Ashby retired from the directorship on 31st December, 1939, and was succeeded by the Assistant Director, Dr. S. P. Wiltshire, who retained the Editorship of the *Review*. Mr. H. A. Dade became Assistant Director and Sub-Editor and Dr. G. C. Ainsworth joined the staff as Assistant Mycologist on 15th June, 1939. Mr. Akimoff, Second Abstractor, retired on 31st July, 1939. Mr. H. A. Dade was absent on military service from 28th December to the end of the financial year.

#### *Postponement of the Fourth Imperial Mycological Conference, 18th to 23rd September, 1939*

This Conference was necessarily postponed owing to the outbreak of war. A mimeographed report of arrangements made for the Conference and the Director's summary of the progress made during the last five years were circulated to the Governments concerned.

#### *Miscellaneous*

The inspection of cacao and banana plants in quarantine in Kew has been continued.

S. P. WILTSHIRE.



## APPENDIX III

FARNHAM HOUSE LABORATORY  
SUPERINTENDENT'S REPORT FOR 1939-40

Eighty-two consignments of beneficial insects, comprising a total of 689,977 specimens, were sent out to Empire countries as follows :—

	<i>Country</i>						<i>Shipments</i>	<i>Specimens</i>
Great Britain	..	..	..	..	..	..	9	23,500
Canada	..	..	..	..	..	..	40	368,056
Australia	..	..	..	..	..	..	17	43,880
New Zealand	..	..	..	..	..	..	12	252,919
India	..	..	..	..	..	..	1	1,000
Mauritius	..	..	..	..	..	..	3	622
							<hr/> 82	<hr/> 689,977

The volume of material handled was thus somewhat larger than in the preceding year. The field of work was, however, steadily restricted. The events in Czechoslovakia had rendered work in that region impossible. In September, Germany attacked Poland and war was declared, which necessitated the closing down of the work in Scandinavia, from which Dr. J. E. Hardy returned with difficulty, having been obliged to abandon his car and personal effects. Investigations in the French Mediterranean area were, however, continued throughout the financial year.

Contributions received for work from Empire Governments, etc., were as follows :—

Canada	..	..	..	£	s.	d.	
				3,241	17	6	(This amount includes the sum of £169 13s. 1d. outstanding on 31st March, 1939, and £1,027 10s. 0d. in advance for 1940-41, but does not include £814 11s. 6d. outstanding on 31st March, 1940, for work carried out during 1939-40.)
Australia	..	..	..	5	10	9	
New Zealand	..	..	..	622	10	3	(This amount does not include the sum of £106 19s. 6d. outstanding on 31st March, 1940.)
Colonial Office	..	..	..	6	15	3	
Ministry of Agriculture and Fisheries.				50	0	0	(This does not include the sum of £79 2s. 1d. outstanding on 31st March, 1940.)
Forestry Commission	..	..	..	32	16	10	(This amount does not include the sum of £27 11s. 3d. outstanding on 31st March, 1940.)
Mauritius	..	..	..	47	1	0	(This amount includes the sum of £2 5s. 5d. outstanding from 1938-39, but not that of £8 0s. 1d. outstanding on 31st March, 1940.)
Dr. H. L. Parker	..	..	..	1	3	8	
				<hr/> £4,007	<hr/> 15	<hr/> 3	

The work carried out may be briefly summarized as :—

#### INSECTS AFFECTING CEREAL AND FORAGE CROPS

WHEAT-STEM SAWFLY (*Cephus pygmaeus*, L.).

Seven consignments of the Sawfly, containing 70,532 specimens, and 7 of the parasite *Pleurotropis benefica*, containing 547 specimens, were despatched to Canada.

#### INSECTS AFFECTING DECIDUOUS FRUITS

WOOLLY APHIS OF THE APPLE (*Eriosoma lanigerum*, Hausm.).

Nine consignments, comprising 23,500 specimens of the parasite *Aphelinus mali*, were despatched to various points in Great Britain, and 1 consignment of 1,000 specimens to India.

CODLING MOTH (*Cydia pomonella*, L.).

Investigations on the parasites of the Codling Moth were carried out in the French Mediterranean area by Mr. F. J. Simmonds.

APPLE TORTRIX (*Tortrix postvittana*, Wlk.).

At the request of the Ministry of Agriculture in the United Kingdom a study of the biology and parasites of this dangerous imported insect was carried out by Mr. A. L. Abel in the area of infestation at Newquay (Cornwall).

#### INSECTS AFFECTING FOREST AND SHADE TREES

SPRUCE AND PINE SAWFLIES (*Diprion polytomum*, Htg., and *D. sertifer*, Geoffr.).

As a result of work in Sweden, Finland and Esthonia carried out by Dr. J. E. Hardy and his assistants, 15,000 cocoons of *D. polytomum* and 32,627 cocoons of *D. sertifer* were despatched to Canada.

HOLLY LEAF-MINER (*Phytomyza ilicis*, Curt.).

Four consignments of parasitized material, comprising 110,000 specimens, were sent to Canada.

BALSAM BARK LOUSE (*Chermes (Dreyfusia) piceae*, Ratz.).

Twelve consignments of *Exochomus*, the predacious Ladybird, containing 28,000 specimens, and 1 consignment, containing 350 specimens, of the neuropterous predator, *Hemerobius stigma*, were sent to Canada.

LARCH CASE BEARER (*Coleophora laricella*, Hb.).

Four consignments from Great Britain, containing 75,000 specimens, and 1 consignment from France, containing 6,000 specimens, were sent to Canada.

PINE BARK BEETLES (*Myelophilus piniperda*, L.).

Mr. H. S. Hanson continued his work on the problem of the Pine Beetles in Great Britain, with a view to the preparation of a Bulletin on these insects, requested by H.M. Forestry Commission.

#### INSECTS AFFECTING VEGETABLE AND GARDEN CROPS

DIAMOND BACK MOTTH (*Plutella maculipennis*, Curt.).

At the request of the Entomological Departments in New Zealand, careful investigations in the field and laboratory were carried out by Dr. D. C. Lloyd in order to determine the suitability of the various parasites of *Plutella* for New Zealand, and whether all the available species should be introduced. Important and practically significant results were secured.

CABBAGE WHITE BUTTERFLY (*Pieris rapae*, L.).

Five consignments of *Apanteles rubecula*, Marsh., comprising 509 specimens, and 3 of *Apanteles glomeratus*, L., comprising 27,411 specimens, were despatched to New Zealand.

PEA MOTH (*Cydia nigricana*, Steph.).

Two consignments, comprising 30,000 specimens of this insect, were prepared and shipped to Canada by Dr. E. Cameron.

#### MISCELLANEOUS INSECTS

WHITE GRUBS (*Melolontha melolontha*, L.).

Dr. M. G. Walker continued the breeding of the White Grub parasite *Dexia rusticata*, L., and shipped to Mauritius three consignments containing 622 specimens.

BANANA BORER (*Cosmopolites sordidus*, Germ.).

A consignment of *Dactylosternum* beetles, for use against the Banana Borer in Jamaica, was received from Malaya and transhipped to the West Indies.

#### BIOLOGICAL CONTROL OF WEEDS

Four shipments of the Ragwort Seedfly (*Pegohylemyia seneciella*, Meade), comprising 225,000 specimens, were collected and despatched to New Zealand by Dr. Cameron. This species has become established in New Zealand and already exists in considerable numbers in certain localities.

#### AUSTRALIAN WORK

We have to report with deep regret the untimely death of Mr. S. Garthside, formerly in charge of the work of the Commonwealth Council for Scientific and Industrial Research of Australia, at Farnham House Laboratory. Mr. Garthside was drowned on 17th August, 1939, in a heroic attempt to save the life of a bather in the sea at Porth Towan, Cornwall. His death was a heavy loss to the C.S.I.R. and to entomology in general.

#### RESEARCH AND UNIVERSITY WORK

Since the recognition of the Laboratory by the University of London, four students have registered for the Ph.D. degree: Dr. J. E. Hardy of the Laboratory staff, Mr. A. L. Abel, formerly of Cardiff University, Miss F. J. Jeffreys of New Zealand, and Miss M. B. Brewer of South Africa. Mr. F. J. Simmonds was allowed by the University of Cambridge to carry out the last year of his work for the Ph.D. degree under the supervision of the Superintendent. Miss M. G. Walker has continued her research work on a Carnegie Fellowship. Dr. E. S. Narayanan of India, after completing his work for the Ph.D. of the University of London in the Imperial College of Science and Technology, spent several months at the Laboratory, by arrangement with the Government of India, studying methods of biological control and discussing problems with the Superintendent and members of the staff.

#### PUBLICATIONS

Seven papers dealing with various aspects of the work of the Laboratory were published by members of the staff during the financial year.

#### STAFF

Mr. F. J. Simmonds was given a temporary appointment on 15th May, 1939, as Junior Entomologist. Miss M. Thompson was given a temporary appointment for work on the Library and Parasite Catalogue on 2nd October, 1939. Mr. F. Alford, Laboratory Assistant, was called up for military service on 2nd January, 1940.

#### LIBRARY AND EQUIPMENT

The library now includes 789 bound volumes and 4,813 separate papers. Two binocular microscopes have been purchased for research workers. The main greenhouse in the Laboratory

grounds has been rebuilt by the Caretaker, Mr. J. W. Smith, in a way that renders it much more useful for the investigations in progress.

#### PARASITE CATALOGUE

After some preliminary experiments a method of preparing the contents of the Parasite Catalogue for publication was decided upon, in consultation with Sir Guy Marshall and Dr. S. A. Neave. Parts 1 to 4 have now been completed and checked by Miss M. Thompson with the original cards.

Over 20,000 cards have been added to the second volume of the Catalogue.

#### VISITORS

Visitors to the Laboratory during the past year included Professor H. S. Smith of Riverside, California, Professor J. Davidson of the Waite Agricultural Institute, South Australia, Professor and Mrs. M. Thomsen of Copenhagen, and Dr. R. H. Le Pelley of Kenya.

W. R. THOMPSON,  
*Superintendent.*

IMPERIAL BUREAU OF SOIL SCIENCE  
DEPUTY DIRECTOR'S REPORT FOR 1939-40

The outbreak of war did not seriously affect the general nature or the quantity of the Bureau's work, except for a noticeable falling-off in correspondence and enquiries received from overseas. This decline occurred in the early days of the war, and persisted. On the other hand, the number of papers to be abstracted increased, possibly due to a desire on the part of European workers to publish their results while the opportunity remained. A not altogether regrettable tendency is becoming apparent for papers to be shorter.

The appointment of Dr. H. Nicol as scientific assistant in May, 1939, was mentioned in last year's Report. Miss R. Silbiger joined as temporary abstractor in June, and Miss J. N. Combe resigned in November to take up war work in the Women's Royal Naval Service.

No changes have been made in the form or matter of the abstract journal. It is satisfactory, however, that in spite of the war the number of subscriptions taken out for 1940 slightly exceeded that for 1939. The number of papers noted in Vol. II (1939) was approximately 2,800. An additional large number of papers not deemed of sufficient importance or interest to merit notice in "Soils and Fertilizers" was referenced in the general card index. A beginning was made with the task of overhauling the card index which now contains about 100,000 cards. As the index increases in size, and notions and fashions in soil science change, periodical "overhauls" become necessary. A revised and very comprehensive subject index has been prepared which greatly expedites the tracking down of information.

None was published in the twelve months under review. This was partly due to delays caused by the war. Progress, however, was made with the preparation of three Technical Communications, all of which should be issued in 1940. These are "The Minor Elements of the Soil," by G. V. Jacks and H. Scherbatoft; "Rothamsted Experiments on Wheat," by E. J. Russell and D. J. Watson; "Soil Moisture," by R. K. Schofield.

A copy of the "Farmers' Guide to Agricultural Research, 1938," published by the Royal Agricultural Society of England, was sent free to our Official Correspondents.

Seventy enquiries (as against 82 for 1938-39) were received during the year. Their sources (by continents) were as follows. Figures (in brackets) are those for 1938-39 :—

Africa	..	..	..	..	..	8	(8)
America	..	..	..	..	..	5	(12)
Asia ..	..	..	..	..	..	14	(17)
Australia and New Zealand			..	..	..	6	(15)
Europe	..	..	..	..	..	37	(30)
						70	(82)

## VI. SALES OF PUBLICATIONS

Receipts from sales for 1939-40 and 1938-39 are given below :—

	1939-40.	1938-39.
	£ s. d.	£ s. d.
Technical Communications .. .. .	133 14 11	219 12 5
Soils and Fertilizers * .. .. .	201 19 7	235 4 8
Bibliographies of Soil Science .. .. .	94 7 3	92 15 2
Miscellaneous .. .. .	15 18 10	7 19 8
	£416 0 7	£555 11 11

## VII. REPRINT LIBRARY

Three hundred and twenty-four new reprints were received and 125 were sent out on loan.

## VIII. VISIT TO RUSSIA

The Director and Deputy Director visited the All-Union Agricultural Exhibition in Moscow in August, 1939, and research stations and collective farms in the regions of the Lower Volga. Some impressions of the tour were given in "Soils and Fertilizers," Vol. II, No. 5.

## IX. ANNUAL MEETING OF AGRICULTURAL RESEARCH WORKERS

Seventy-five members from agricultural and forestry departments overseas and others interested in the land attended the annual meeting at Rothamsted on 27th June, 1939, and were addressed by the Most Hon. the Marquess of Dufferin and Ava. The visitors inspected the experimental fields in the morning, and the laboratories and bureau in the afternoon.

G. V. JACKS,  
*Deputy Director.*

\* The lower figure for 1939-40, as compared with 1938-39, is due to delay in receipt of subscriptions. As already mentioned, the number of subscriptions entered has slightly increased.

## APPENDIX V

## IMPERIAL FORESTRY BUREAU

## DEPUTY DIRECTOR'S REPORT FOR 1939-40

The Imperial Forestry Bureau has now completed its first full year. Much time has been devoted to acquiring information and to systematizing the work of the Bureau. Possible methods for improving office routine, presentation of published material, circulation of periodicals, contacts with world literature, etc., have been and are being considered and adopted where thought to be of definite value. Numerous constructive suggestions made by members of the staff in this regard have been most useful.

Members of the staff of the Imperial Forestry Institute have given the Bureau much valuable assistance during the year, both directly in supplying information on technical matters, and also in helping to develop relations between the library and Bureau to a point of maximum mutual benefit and usefulness.

*Staff.*—The work of the Bureau began in September, 1938, under the direction of Mr. J. N. Oliphant, until recently Director of the Imperial Forestry Institute. The staff of the Bureau, consisting of a documentation officer, two abstractors and a clerical staff of two, was taken directly from the subordinate staff of the Imperial Forestry Institute. The Deputy Director of the Bureau took over his duties on 8th June, 1939. Mr. Oliphant left the Institute in July, 1939, to become Chief Conservator of Forests for Nigeria, and since then Dr. L. Chalk of the staff of the Imperial Forestry Institute has been Acting Director of the Bureau.

*Referencing of Literature.*—The principal source of material for the Bureau is the library of the Institute, and the Bureau is co-operating with the library to increase the number of important literature received. Furthermore, the Bureau has made contact with other libraries in Oxford and elsewhere in England, and receives on loan from them material on subjects connected with forestry. All literature received by the Bureau, no matter from what source, is fully referenced whether it is to be used for abstracting or not. In this way a subject and author index of the world literature on forestry and allied subjects is being built up. The object is to have as complete a record of literature as possible and to this end contacts are being made abroad in countries whose literature is not fully represented in the libraries of this country. Copies of the subject and author index slips are supplied to the library of the Institute to complete its records.

*Publications.*—*Forestry Abstracts* is the principal publication of the Imperial Forestry Bureau. It is published quarterly and the first volume has just been completed with the issue of the fourth number. The object of this publication is to give useful abstracts and references on important and current forestry literature. The Bureau is dealing with approximately 260 periodical or series publications representing 39 countries and some 15 languages. Apart from the free issue of volumes of *Forestry Abstracts* to forest departments, official correspondents, etc., within the Empire, on 31st March, 1940, there were 122 subscribers. Ten volumes are issued on an exchange basis for other useful publications or literature of equivalent value. It is felt that the number of subscribers to this journal can be increased considerably, particularly in non-Empire countries, and to this end it is proposed during the coming year to circulate a number of sample pages and descriptive letters to the potential market abroad.

*The News Bulletin of Empire Departments.*—For the three years 1936-38 inclusive, the *News Bulletin* was issued twice a year in mimeograph by the Imperial Forestry Institute; and

had a circulation of 229 free and 16 paid copies. After some preliminary enquiries it was decided in 1939 to print the bulletin, but under the joint sponsorship of the Institute and the Bureau, the editing of the news letters to be the responsibility of the Bureau. It was also decided to make a charge of 2s. 6d. a year; postage free, to all subscribers and to do away with the free list. Subscriptions are confined to forest officers within the Empire and in a few cases to others intimately connected with Empire Forestry. This project, which was initiated by Mr. J. N. Oliphant, has proved very successful and a keen interest is being shown in the publication by forest officers and subordinates in many of the Dominions and Colonies. Subscribers in 1939-40 numbered 427, producing a gross income of £53 6s. 6d. The total cost of printing and distributing the two numbers of the *News Bulletin* was £77 9s. 9d., and the Institute and Bureau each contributed half of the deficit of £24 3s. 3d. for the year.

*Technical Communications.*—The first technical communication to be issued by the Imperial Forestry Bureau is being prepared. It deals with the literature on Forest Fire Hazard Research, a branch of forest protection that has made rapid strides in recent years and is of importance in any country or region where fire is a menace to the forests. This communication should be ready for publication early in the summer. Other subjects that are being considered for treatment in technical communications during the next year or so are :—Forest Genetics (in co-operation with the Imperial Bureau of Plant Breeding and Genetics, Cambridge), Aerial Surveying, Forest Vegetation and its Relation to Climatic Conditions, and the Durability and Preservative Treatment of Tropical Woods.

*Enquiries.*—The number of enquiries that have been received during the year (mostly from July, 1939, onwards) total 38. These may be distributed geographically as follows :—Great Britain 16, Continental Europe 6, America 6, Africa 6, Asia 4.

J. W. B. SISAM,  
*Deputy Director.*



## APPENDIX VI

## POTATO EXPEDITION

STATEMENT BY MR. J. G. HAWKES

Route of South American Expedition, 1939

Date	Place	Department or Province	Country
12.1-19.1 ..	Lima and district .. .. .	Lima	Perú
19.1-20.1 ..	Lima to Mollendo .. .. .	Arequipa	"
20.1 ..	Mollendo to Arequipa .. .. .	"	"
23.1-25.1 ..	Arequipa to La Paz .. .. .	La Paz	Bolivia
3.2-5.2 ..	La Paz to Jujuy .. .. .	Jujuy	Argentina
7.2 ..	Jujuy to Salta and return .. .. .	Salta	"
8.2 ..	Jujuy to Tilcara .. .. .	Jujuy	"
18.2 ..	Tilcara to La Quiaca .. .. .	"	"
21.2 ..	La Quiaca to Villazon .. .. .	Potosí	Bolivia
22.2 ..	Villazon to Tarija .. .. .	Tarija	"
27.2 ..	Tarija to Villazon .. .. .	Potosí	"
28.2 ..	Villazon to Potosí .. .. .	"	"
4.3 ..	Potosí to Sucre .. .. .	Chuquisaca	"
10.3-11.3 ..	Sucre to Cochabamba .. .. .	Cochabamba	"
15.3 ..	Cochabamba to Colomi .. .. .	"	"
17.3 ..	Colomi to Cochabamba .. .. .	"	"
21.3-22.3 ..	Cochabamba to La Paz .. .. .	La Paz	"
25.3-26.3 ..	La Paz to Obrajes valley and return .. .. .	"	"
29.3 ..	La Paz to Tiahuanaco and return .. .. .	"	"
31.3 ..	La Paz to Eucaliptus .. .. .	Oruro	"
3.4 ..	Eucaliptus to La Paz .. .. .	La Paz	"
11.4 ..	La Paz to Achacachi and district .. .. .	"	"
14.4 ..	Achacachi to Copacabana .. .. .	"	"
21.4 ..	Copacabana to Puno .. .. .	Puno	Perú
29.4 ..	Puno to Cuzco .. .. .	Cuzco	"
30.4 ..	Cuzco to Ppisacc and return .. .. .	"	"
3.5 ..	Cuzco to Paucartambo .. .. .	"	"
7.5 ..	Paucartambo to Cuzco .. .. .	"	"
9.5 ..	Cuzco to Ollantaitambo and Macchu Pijchu .. .. .	"	"
10.5 ..	Macchu Pijchu to Calca .. .. .	"	"
11.5 ..	Calca to Cuzco .. .. .	"	"
14.5 ..	Cuzco to Abancay .. .. .	Apurimac	"
15.5-19.5 ..	Abancay to Andahuaylas .. .. .	"	"
22.5-24.5 ..	Andahuaylas to Ayacucho .. .. .	Ayacucho	"
26.5-27.5 ..	Ayacucho to Huancayo .. .. .	Junín	"
28.5 ..	Huancayo to Lima .. .. .	Lima	"

Route of South American Expedition, 1939—*continued*

Date	Place	Department or Province	Country
6.6-11.6 ..	Lima to Guayaquil .. .. .	Guayos	Ecuador
19.6 ..	Guayaquil to Cuenca .. .. .	Azuay	"
26.6 ..	Cuenca to Cañar and return .. .. .	Cañar	"
28.6 ..	Cuenca to Azogues and return .. .. .	"	"
30.6 ..	Cuenca to Riobamba .. .. .	Chimborazo	"
3.7 ..	Riobamba to Quito .. .. .	Pichincha	"
7.7 ..	Quito to Ambato .. .. .	Tungurahua	"
12.7 ..	Ambato to Latacunga .. .. .	León	"
13.7 ..	Latacunga to Mejía (Machachi) .. .. .	Pichincha	"
15.7 ..	Mejía (Machachi) to Quito .. .. .	"	"
21.7 ..	Quito to Cayambe .. .. .	"	"
23.7 ..	Cayambe to Quito .. .. .	"	"
28.7 ..	Quito to Otavalo .. .. .	Imbaburra	"
29.7 ..	Otavalo to Quito .. .. .	Pichincha	"

From 4.8 to 14.8 the expedition was divided into two sections :—

## (a) Route of E. K. Balls

4.8 ..	Quito to Ibarra .. .. .	Imbaburra	Ecuador
5.8-6.8 ..	Ibarra to Tulcán .. .. .	Carchi	"
7.8 ..	Tulcán to Ipiales .. .. .	Nariño	Colombia
8.8 ..	Ipiales to Pasto .. .. .	"	"
11.8 ..	Pasto to Laguna La Cocha and return .. .. .	Putumayo	"
12.8 ..	Pasto to Popayán .. .. .	Cauca	"
13.8 ..	Popayan to Cali .. .. .	Valle de Cauca	"
14.8 ..	Cali to Bogotá .. .. .	Cundinamarca	"

## (b) Route of J. G. Hawkes

5.8 ..	Quito to Bogotá .. .. .	"	"
10.8 and 11.8 ..	Bogotá to Cajicá and return .. .. .	"	"
14.8 ..	Bogotá to Sibaté and return .. .. .	"	"
16.8 ..	Bogotá to San Miguel and return .. .. .	"	"
17.8 ..	Bogotá to Zipaquirá and return .. .. .	"	"
19.8 ..	Bogotá to San Francisco .. .. .	"	"
20.8 ..	San Francisco to Bogotá .. .. .	"	"
22.8 ..	Bogotá to Sogamoso and district .. .. .	Boyacá	"
24.8 ..	Sogamoso to Tunja .. .. .	"	"
26.8 ..	Tunja to Bogotá .. .. .	Cundinamarca	"
31.8 ..	Left Bogotá.		

## LOCALITIES FROM WHERE COLLECTIONS WERE MADE

Date.	Locality.*	Province.	Department.	Country.	Altitude.	Collection Number.†
22-1	Arequipa .. ..	Arequipa	Arequipa	Perú	8,300 ft.	B.5860-B.5877
28-1-29-1	La Paz .. ..	Murillo	La Paz	Bolivia	11,500-12,000 ft.	B.5890-B.5903
6-2	Jujuy .. ..	Jujuy	—	Argentina	4,300-5,300 ft.	B.5921-B.5952
7-2	Salta .. ..	Salta	—	"	5,000 ft.	B.5935-B.5936
9-2-15-2	Tilcara and district	Jujuy	—	"	8,000-13,500 ft.	B.5956-B.6056
10-2	La Quiaca .. ..	"	—	"	11,300 ft.	B.6079-B.6081
28-26-2	Tarija .. ..	Cercado	Tarija	Bolivia	6,800 ft.	B.6084-B.6093
27-2	Tarija to Villazón	Sudchichas	Potosí	"	9,800-11,600 ft.	B.6094-B.6126
28-2	Oploca to Oro Ingenio .. ..	"	"	"	12,600 ft.	B.6127
2-3	Potosí .. ..	Frias	"	"	11,500-13,300 ft.	B.6129-B.6141
6-3-8-3	Sucre .. ..	Oropeza	Chuquisaca	"	8,500-11,000 ft.	B.6146-B.6199
10-3	Potosí .. ..	Frias	Potosí	"	14,500 ft.	B.6201
11-3-14-3	Cochabamba .. ..	Tapacari	Cochabamba	"	9,000-10,900 ft.	B.6202-B.6222
15-3-17-3	Colomi .. ..	Chapare	"	"	10,500-12,000 ft.	B.6241-B.6292
18-3	Cochabamba .. ..	Tapacari	"	"	About 11,600 ft.	B.6300-B.6311
25-3	Palomar .. ..	Murillo	La Paz	"	9,100 ft.	B.6324-B.6325
29-3	Tiahuanaco .. ..	Ingavi	"	"	12,500 ft.	B.6327-B.6357
31-3-2-4	Eucaliptus .. ..	Cercado	Oruro	"	12,100-12,300 ft.	B.6375-B.6413
4-4	La Paz .. ..	Murillo	La Paz	"	9,000-13,000 ft.	B.6414-B.6442
11-4	Huarina .. ..	Omasuyos	"	"	12,500 ft.	B.6443-B.6446
11-4-14-4	Achaecachi and district .. ..	"	"	"	12,500-14,000 ft.	B.6447-B.6512
14-4-18-4	Copacabana .. ..	"	"	"	12,500 ft.	B.6513-B.6543
22-4-25-4	Puno .. ..	Puno	Puno	Perú	12,500-12,700 ft.	B.6545-B.6668
3-5-7-5	Paucartambo .. ..	Paucartambo	Cuzco	"	11,500-13,000 ft.	B.6672-B.6743
11-5	Calca .. ..	Calca	"	"	11,000-14,000 ft.	B.6744-B.6768
12-5	Cuzco .. ..	Cuzco	"	"	13,000 ft.	B.6770
15-5	Abancay .. ..	Abancay	Apurímac	"	About 13,500 ft.	B.6853-B.6887
16-5	Quisahuara .. ..	Andahuaylas	"	"	11,900 ft.	B.6888-B.6890
21-5-24-5	Andahuaylas .. ..	"	"	"	10,500-13,000 ft.	B.6910-B.6931
25-5	Ayacucho .. ..	Huamanga	Ayacucho	"	—	B.6933-B.6962
28-5	Huancayo .. ..	Huancayo	Junín	"	—	B.6964-B.7008
6-6	Lima .. ..	Lima	Lima	"	500 ft.	B.7072
23-6	Cañar .. ..	Cañar	—	Ecuador	11,500-12,000 ft.	B.7084-B.7111
25-6	Cuenca .. ..	Azuay	—	"	8,300 ft.	B.7112-B.7115
25-6	Azogues .. ..	Cañar	—	"	8,300 ft.	B.7116-B.7118
1-7	Riobamba .. ..	Chimborazo	—	"	—	B.7129-B.7133
8-7	Píllaro .. ..	Tungurahua	—	"	10,000 ft.	B.7141-B.7144
9-7-11-7	Ambato .. ..	"	—	"	8,500-11,700 ft.	B.7154-B.7183
12-7	Latacunga .. ..	León	—	"	—	B.7193-B.7195
13-7	Saquisilí .. ..	"	—	"	—	B.7197-B.7215
29-7	Otovalo .. ..	Imbabura	—	"	—	B.7267
5-8	Ibarra .. ..	"	—	"	—	B.7331-B.7332
6-8	San Gabriel (Montúfar) .. ..	Carchi	—	"	About 12,000 ft.	B.7340-B.7341
7-8	Tulcán .. ..	"	—	"	10,000-12,000 ft.	B.7347-B.7352
7-8-8-8	Ipiales .. ..	—	Nariño	Colombia	10,000-10,300 ft.	B.7353-B.7473
9-8	Pasto .. ..	—	"	"	About 10,000 ft.	B.7474-B.7498
					and	B.7548-B.7549
11-8	Laguna La Cocha .. ..	—	Putumayo	"	11,000-11,500 ft.	B.7506-B.7542
12-8	Popayán .. ..	—	Cauca	"	—	B.7543-B.7547
14-8	Calí (various sources) .. ..	—	Valle de Cauca	"	—	B.7550-B.7558
25-8	Bogotá .. ..	—	Cundinamarca	"	—	B.7560-B.7572
9-8	" .. ..	—	"	"	8,500-9,000 ft.	B.7373-B.7378
15-8	Zipaquirá .. ..	—	"	"	8,000-9,000 ft.	B.7402-B.7409
16-8	San Miguel .. ..	—	"	"	9,800 ft.	B.7410-B.7414
17-8	La Caldera .. ..	—	"	"	11,400 ft.	B.7418-B.7426
20-8	San Francisco .. ..	—	"	"	6,500 ft.	B.7427-B.7428
22-8-23-8	Sogamoso and Tota .. ..	—	Boyacá	"	10,000-11,100 ft.	B.7458-B.7466
24-8-25-8	Tunja .. ..	—	"	"	8,400-9,700 ft.	B.7467-B.7586

\* This does not represent in every case the exact locality, but the largest town nearest to it.

† Balls' original collecting numbers are given here; the many gaps in the sequence are due to the fact that specimens other than potatoes were also collected by Balls and Gourlay. The Empire Potato Collection Number (E.P.C.) was not given to each sample until it was received in Cambridge. Owing to the different methods of despatch the specimens did not arrive in the sequence in which they were collected. Hence any attempt to give E.P.C. numbers in this table would involve unnecessary complications.

In addition to the samples collected by members of the expedition shown in Table above, many collections were made by local botanists, agronomists and people interested in potato culture. Some of these represented portions of experimental collections, others being collected at the request of the expedition and sent on to various points at a later date. Portions, however, were sent straight through to Cambridge.

The main additions to the Empire Potato Collection from these sources are as follows :—

(1) Two collections made through Dr. Martin Cardenas of Cochabamba University, Bolivia, and received in Cambridge in July and September, 1939, respectively. (E.P.C. 927-948 and 841-885.)

(2) A collection of potatoes from the Department of Tarija, Bolivia, made by the Bolivian Ministry of Agriculture and received in La Paz in March, 1939. (B.6318-6323 and B.6363-6374.)

(3) Three large collections of material from the department of Puno, Peru, grown in the Granda Taller Escolar de Puno by Dr. R. P. V. Soukup. The first of these was brought to Cambridge by members of the Percy Sladen Expedition to Lake Titicaca in December, 1937, and augmented by small additions sent by Soukup in 1938. These were known at first by their native names and were only later given E.P.C. numbers (E.P.C. 1066-1150.) The second collection was received in April, 1939, when the expedition was collecting at Puno. (B.6545-6615 and B.6623-6664.) Unfortunately the whole of this collection was lost in the post in Peru (B.6545-6615 and B.6619-6666). Lastly, a third set of Puno varieties was sent down to Lima and incorporated in the general collection in the end of May, 1939 (B.7009-7020).

(4) A series of varieties from Paucartambo made by Señor Don Luis Angel Yavar from the province of Paucartambo, Peru. These were sent directly to Cambridge, arriving in August, 1939 (E.P.C. 655-763).

(5) Samples collected by Dr. Cesar Vargas from the vicinity of Cuzco, Peru, and sent to Lima, where they were incorporated into the general collection early in June, 1939 (B.7022-7056).

(6) Several samples collected by Dr. W. B. Gourlay from Huancayo and Cuzco, Peru (E.P.C. 300-308).

(7) Samples from Central and Northern Peru obtained from the Agricultural Experimental Station at La Molina, near Lima, Peru (B.7066-7071).

(8) Two sets of samples from Sr. D. Enrique Malo, Ecuador. B.7124-7127 were from Cuenca. A further parcel of samples from Quito unfortunately were all rotten when they were received in Cambridge in January, 1940.

(9) A small collection of wild and cultivated forms from near Quito presented by Sr. S. Luis de Ascásubi in July, 1939 (B.7237-7245).

(10) A number of samples collected through the agency of Sr. D. G. E. Viver from the vicinity of Quito, July, 1939 (B.7269-7317).

(11) A collection of Colombian forms grown at the Granja Fagueta, Cajica, near Bogotá (B.7379-7399). These were received through the courtesy of the Colombian Ministry of Agriculture in August, 1939.

#### DETAILS OF POTATO MATERIAL DESPATCHED TO THE BRITISH EMPIRE (September, 1940)

The following amounts of E.P.C. material have already been despatched to the several countries of the British Empire concerned. As a result of the harvest of 1940 much material will be available for distribution.

Country						Number of Specimens Sent.	
Malaya	..	..	..	..	..	..	102
Australia	..	..	..	..	..	..	146
New Zealand	..	..	..	..	..	..	148
Canada	..	..	..	..	..	..	178
India	..	..	..	..	..	..	181
Ceylon	..	..	..	..	..	..	188
Trinidad	..	..	..	..	..	..	20

The sample collection of South American potatoes sent to Trinidad, together with eleven British varieties, were all high yielding cultivated forms, selected so as to represent as wide a range of latitude and altitude as possible. Many varieties from the lower subtropical localities were included.

The named South American varieties (those with no E.P.C. number) are all high altitude cultivated forms belonging chiefly to *S. andigenum* and also to the frost-resisting species *S. Juzepczukii*, *S. ajanhuiri* and *S. curtilobum*. E.P.C. Nos. 1-50 are Mexican wild species for the most part. Tests in Cambridge this year have shown that many possess a very high degree of resistance to *Phytophthora infestans* whilst a few appeared to be immune under the most exacting conditions. Chief amongst these latter is E.P.C. 40, *S. lanciforme* Rydb., a species which it has been so far impossible to infect with *Phytophthora* although under these conditions all but one of the *S. demissum* varieties showed some degree of attack.

The varieties collected from the hot dry valleys of the northern Argentine may be of use in breeding for drought resistance. These are E.P.C. 51-53, 74-91 and 100-118.

The remainder of the forms comprise many capable of withstanding severe frosts whilst others taken from low subtropical altitudes may be of use in breeding for varieties adapted to tropical conditions.

Many varieties are very quick maturers with a short dormancy period.

Number of specimens collected on the South American expedition :—

Argentina	..	..	..	..	42 specimens	
Bolivia	..	..	..	..	359	„
Peru	..	..	..	..	478	„
Ecuador	..	..	..	..	125	„
Colombia	..	..	..	..	160	„
Mexico	..	..	..	..	46	„
						(Collected by Balls and Gourlay in 1938.)
Total number	..	..	..	..	1,210	„

## APPENDIX VII

## PUBLICATIONS

## (a) ORDERS

**Imperial Institute of Entomology.** Orders and payments for all publications to be sent to :—

The Assistant Director,  
The Imperial Institute of Entomology,  
41, Queen's Gate,  
London, S.W.7,  
England.

**Imperial Mycological Institute.** Orders and payments for all publications to be sent to :—

The Director,  
The Imperial Mycological Institute,  
Ferry Lane,  
Kew,  
Surrey,  
England.

**Nutrition Abstracts and Reviews.** Orders and payments to be sent to :—

The Deputy Director,  
The Imperial Bureau of Animal Nutrition,  
The Rowett Institute,  
Bucksburn,  
Aberdeen,  
Scotland

**All Bureaux.** Orders and payments for all publications (other than Nutrition Abstracts and Reviews, see above) of all bureaux, whether journals, including back numbers and odd parts, other periodicals or occasional publications to be sent to :—

Imperial Agricultural Bureaux,  
Central Sales Branch,  
Agricultural Research Building,  
Penglais,  
Aberystwyth,  
Wales.

*Note.*—Mainly for the convenience of London booksellers occasional publications of all the bureaux and back parts of bureaux periodicals, including journals, are available at :—

Imperial Agricultural Bureaux,  
2, Queen Anne's Gate Buildings,  
Dartmouth Street,  
London, S.W.1,  
England.

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**Payments are in sterling.** If foreign bills or currency are sent, exchange is in all cases at official or Bank of England rates.

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## (b) LIST

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Separate parts .. .. .	3	0	1	6
Annual Subject Index (when sold separately) .. .. .	6	0	3	0
Subject Index—Vols. I—III .. .. .	5	0	I—X	10 0
Back Volumes—Vol. I (1913)—VII .. .. .	per vol.	15 0		10 0
Vol. VIII (1920)—XXII (1934) .. .. .	per vol.	24 0		12 0
Vol. XXIII (1935) <i>et seq.</i> .. .. .	per vol.	42 0		21 0
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Postage extra.

Some of the Sections into which Volumes LXI—LXVII were divided are still available. Prices on application.

*Occasional***An Abstract of the Legislation in Force in the British Empire Dealing with Plant Pests and Diseases up to the Year 1920.**

By E. Marguerite Ralfs, B.A. Med. 8vo. 65 pp. Paper Covers. Price, 2s. 6d. 1921.

**Tsetse-Flies. Their Characteristics, Distribution and Bionomics, with some account of possible Methods for their Control.**

By Major E. E. Austen, D.S.O., and Emile Hegh. Med. 8vo. 188 pp. With 5 plates and 19 figures. Paper Covers. Price, 7s. 6d. Postage 4d. extra. 1922.

**The Phases of Locusts in South Africa.**

By Prof. J. C. Faure. Roy. 8vo. 132 pp. Paper covers. With 6 coloured, 19 black-and-white plates and 1 map. Price 12s. (Reprinted from the Bulletin of Entomological Research, Vol. XXIII, Pt. 3. September, 1932.)

**Locusts and Grasshoppers. A Handbook for their Study and Control.**

By B. P. Uvarov. Imp. 8vo. Pp. xiii and 352. With 9 plates and 118 text figures. Bound in Buckram. Price 21s. net. Postage, inland, 7d.; abroad, 1s. 3d. 1928.

**The Coconut Moth in Fiji. A History of its Control by means of Parasites.**

By J. D. Tothill, D.Sc., T. H. C. Taylor, M.Sc. (Lond.), and R. W. Paine, B.A. Containing a full account of the successful campaign against this important coconut pest. Imp. 8vo. Pp. vi and 269. With 12 coloured and 22 black-and-white plates, 1 map, and 121 text figures. Bound in Buckram. Price, 31s. 6d. net. Postage, inland, 7d.; abroad, 1s. 3d. 1930.

**The Biological Control of an Insect in Fiji. An account of the Coconut Leaf-mining Beetle and its Parasite Complex.**

By T. H. C. Taylor, M.Sc. (Lond.). Royal 8vo. Pp. x and 239. With 23 plates, 2 maps and 17 text figures. Bound in cloth. Price 12s. Postage, inland, 7d.; abroad, 10d. 1937.

**A List of the Entomologists Employed in the British Empire.**

Prepared for the Third Imperial Entomological Conference, 1930. Med. 8vo. 16 pp. Paper covers. Price, 2s. 6d. 1930.

**Report of the Third Imperial Entomological Conference, 17th-27th June, 1930.**

Med. 8vo. 59 pp. Paper covers. Price, 2s. 0d. 1930.

**Report of the Fourth Imperial Entomological Conference, 19th-27th September, 1935.**

Roy. 8vo. 70 pp. Paper covers. Price, 4s. 0d. 1935.

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22.	Technique Adopted in the Production of Grass Seed at the Welsh Plant Breeding Station by Gwilym Evans. July, 1937 .. .. .	5	0
23.	Production of Seed of Herbage and Forage Legumes. September, 1937 .. .. .	5	0
24.	Collection of Native Grass Seed in the Great Plains, U.S.A., by E. J. Crider and M. M. Hoover. September, 1937 .. .. .	2	0
25.	Erosion and Soil Conservation (Joint publication of Bureaux of Soil Science and Pastures and Forage Crops). March, 1938 .. .. .	5	0
26.	Research on Grassland, Forage Crops and the Conservation of Vegetation in the United States of America. September, 1939 .. .. .	5	0
27.	The Control of Weeds. Edited by R. V. Whyte. January, 1940 .. .. .	7	6
28.	Technique of Grassland Experimentation in Scandinavia and Finland. January, 1940 .. .. .	2	6
29.	Grassland Investigations in Australia. January, 1940 .. .. .	5	0
30.	The Grasslands of the Argentine and Patagonia. by William Davies, November, 1940 .. .. .	2	9
MIMEOGRAPHED PUBLICATIONS. (Price: 2s. 6d. each.)			
No.			
1/1938	Fourth Session of the Academy of Agricultural Sciences, Moscow. (Published January, 1938).		
2/1938	Translations from Swedish and Norwegian. December, 1938.		
3/1938	Collection of translations from German, Dutch and Spanish. December, 1938.		
4/1939	Bibliography on red clover ( <i>Trifolium pratense</i> ). April, 1939.		
5/1939	Bibliography on white clover ( <i>Trifolium repens</i> ). April, 1939.		
6/1939	Bibliography of the published works of V. N. Ljubimenko. May, 1939.		

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2.	Field Experiments in Horticulture. 1931. T. N. Hoblyn .. .. .	s. d.
3.	Investigations on the Standardization of Citrus Trees by Propagation Methods. 1932 .. .. .	2 0
4.	Problems of Fruit Tree Nutrition. Possible Lines of Approach. 1933. T. Wallace .. .. .	2 0
5.	The "Degeneration" of the Strawberry. 1934. D. Akenhead, R. V. Harris, G. H. Berkeley, A. M. Massee .. .. .	2 0
6.	The Nutrition and Manuring of Soft Fruits. 1936. T. Wallace .. .. .	2 0
7.	Vegetative Propagation of Tropical and Sub-tropical Fruits. 1936. G. St. Clair Feilden and R. J. Garner .. .. .	2 0
8.	Horticultural Aspects of Woolly Aphis Control, together with a survey of the literature. 1936. R. M. Greenslade .. .. .	2 6
9.	A Review of the Literature on Stock-Scion Incompatibility in Fruit Trees, with particular reference to pome and stone fruits. 1937. G. K. Argles .. .. .	5 0
10.	Plant Injection for Diagnostic and Curative Purposes, 1938. W. A. Roach .. .. .	5 0
11.	Fruit Juices and Related Products, 1939. V. L. S. Chailey and T. H. J. Harrison .. .. .	5 0
12.	Plant Hormones and their Practical Importance in Horticulture, 1939. H. L. Pearse .. .. .	3 0
13.	Vegetative Propagation of Tropical and Sub-Tropical Plantation Crops, 1940. G. St. Clair Feilden and R. J. Garner .. .. .	3 6

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1. Technique in Pot Culture for Fruit Plants, 1933. Dr. T. Wallace .. .. .	0	6
2. Experimental Data on Orchard and Small Fruit Manuring, 1933. S. T. Antoshin .. .. .	1	0
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